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FISHERIES RESEARCH CENTRE

FISH KILLS IN IRELAND 1991-1992

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Fishery Leaflet 157 *August 1993*

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by

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Department of the Marine Dublin 2

Summary

The numbers of fish kills were below the average for the ten years since the systematic recording of incidents began in 1983. Totals were 60 and 51 for 1991 and 1992 respectively. Both years therefore represent a continuation of the downward trend which began after the peak of 122 incidents in 1987.

An important factor in the improved situation was the reduction in the number of silage discharges which had been the most serious problem for a number of years. Untreated sewage and industrial effluents in general have also shown downward trends. Two serious problems remaining are 'enrichment' and run-off from farmyards, which includes spillage of slurry. Slurry and farm effluents in fact showed an increase in 1992 over 1991.

Enrichment by excessive phosphorous, derived both from partially treated domestic sewage and from fertiliser, causes algal blooms leading to deoxygenation of the water and the death sometimes of very large numbers of fish - to say nothing of environmental conditions which are unacceptable to everybody who uses rivers or lakes.

The effect of a discharge of effluent depends on many factors. In wet weather with high stream flows the damage will be minimised because the effluent is diluted quickly. A spillage beside a small river will led to a much more extensive fish kill than the same quantity of effluent will cause in a large one. These and other factors probably explain why, in spite of the small number of fish kills in 1992, nearly twice as much river was affected as in 1991.

Major incidents

In 1990 there were five reports of 10,000 or more fish being killed. Only two incidents of this order were reported in the two years under review: 10,000 trout and salmon in the Clarinbridge River in August 1991 and 15,000 trout in the Kilnahown River near Portarlington in July 1992. Other reports of more than one thousand deaths were from the Camac, the Ballyvorheen and the Raford in 1991 and, in 1992, the Killary (Co. Louth), the Sheep in Co. Tipperary, Loughs Allen and Derg on the Shannon and Lough Garty in Co. Cavan. Four of these were caused by silage or other farm effluents, two by industrial effluents and three by enrichment and one by a spillage of cement. Details of all incidents are given in Tables 1 and 2.

Distribution and dates

The greatest numbers of fish kills in both years took place in the Southern Region. where there was a marked increase in the number of agriculture-based incidents in 1992. The Eastern region showed a welcome decline to 6 and 5 respectively, compared with a lowest figure of 11 in the decade. The Shannon Region had below average figures for both years. A number of the Shannon Region incidents were very limited in extent so that a satisfactory reduction of problems was evident. Southwestern and Northern Regions were both below average and Western and Northwestern again showed their usual pattern of few fish kills or none at all.

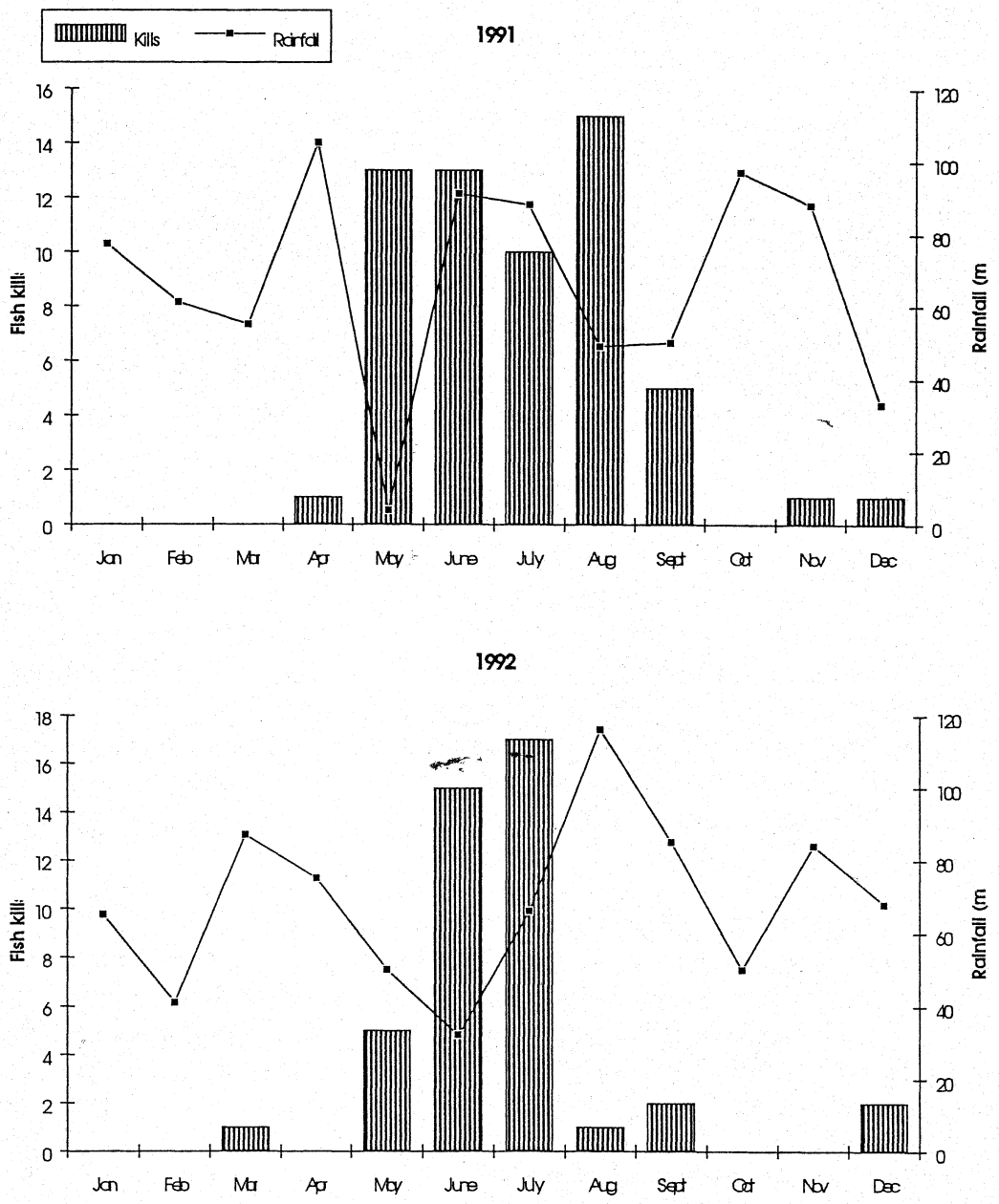
The lengths of river affected showed a surprising increase from an average of 1.6 km in 19911 to 3.4 km in 1992. The means of stream lengths in the Regions are shown in Table 3. The total in 1992 was nearly double that for 1991 which meant that, although there were far fewer fish kills in 1992, the damage was more extensive. The high 1992 figure is only partly explained by the exceptionally long reaches poisoned in the River Dee and its tributary the Killlary in Co. Louth: more than 30 km in June and 12 km the following August. Tweny out of 24 discharges in the Eastern and Southern Regions affected 2 km or more of stream in 1992, compared to 12 out of 27 in 1991. Lengths of stream affected in the seven Regions are shown in Table 4.

Both years began well, with only one incident reported until May of each. In 1991 fish kills were evenly distributed from May to August while in 1992 there was a distinct peak in June and July with small numbers in the other months. August 1992 with only one incident equalled its best since 1983. The rainfall data in Figure 1 show clearly the negative effect of a drought in May 1991 and to a less marked extent of low rainfall in June 1992.

Causes

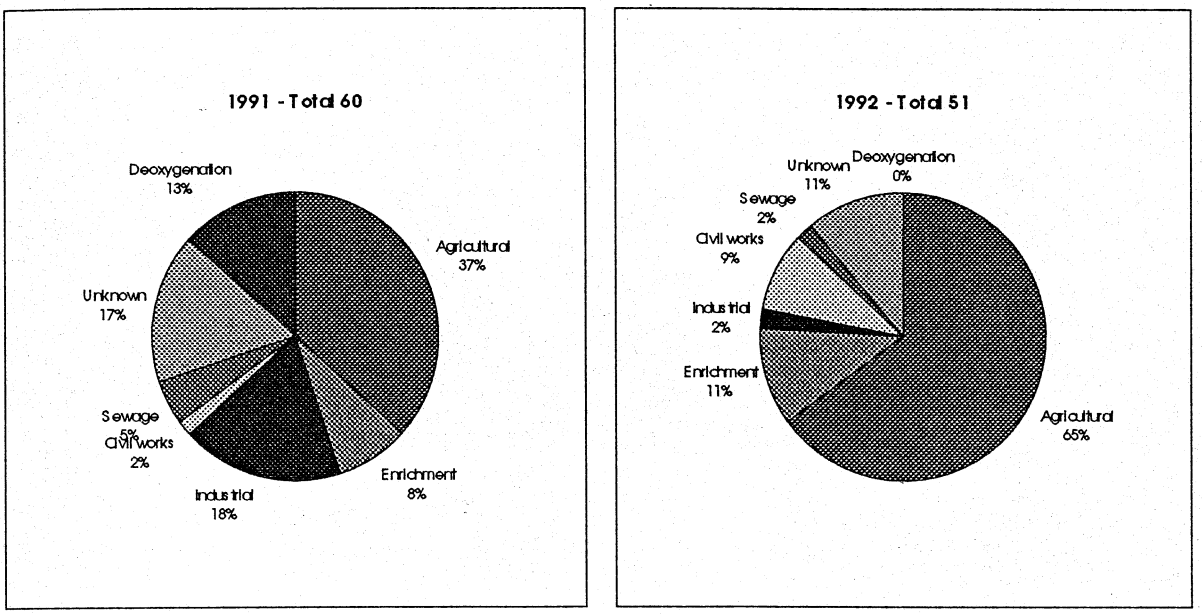
The causes are listed in detail in Table 2. Agriculture continued to be the major source of trouble in both years, although responsible for less than half the incidents in 1991. Silage accounted for 13 kills in 1991 and for 12 in 1992. Farm effluent and pesticide spillage both increased in 1992. Industrial spillages were a significant factor in 1991. Enrichment and de-oxygenation are probably closely associated since de-oxygenation frequently results from heavy weed growth in enriched waters.

Figure 1. Number of fish kills in each month and total monthly rainfall at Birr.



Inadequately treated sewage has continued to cause fish kills, even though at a low level. Discharge from swimming pools causes almost perennial problems. Water which looks clean and which is acceptable to swimmers may have a concentration of chlorine which is lethal to fish. Sewage, swimming-pool discharge and problems caused by accidental spillages on building sites or in road works are shown together as 'Civil works' in Figure 2.

Figure 2. Principal causes of fish kills in 1991 and 1992



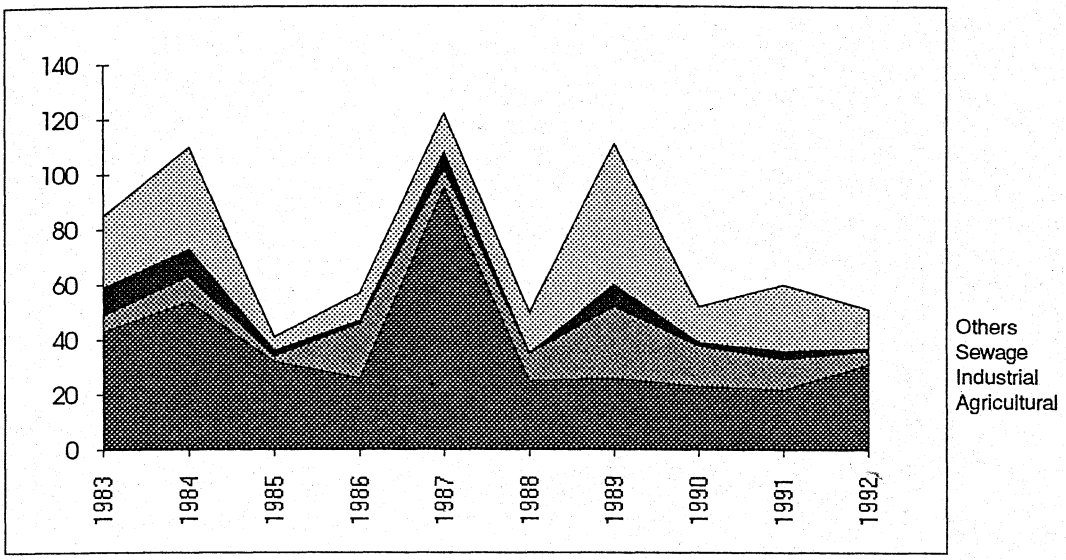
Trends since 1983

Details of fish kills have now been collected regularly over a period of ten years (Tables 4 and 5). Five fish kills in the Shannon Region in 1985 were omitted from the report for that year and increase the total to 41. The figure for 1992 was the third lowest for the whole period. Although the number of incidents in 1991 was considerably higher than in 1992, the total length of stream affected was very much lower.

The extent of fish kills is variable and depends on a number of factors. The same quantity of effluent will affect a much longer stretch of a small stream than of a large one. The effect will be worse in dry weather than in wet because the effluent will not be diluted sufficiently to be harmless until it has travelled a long distance. In 1992 the average length of stream, 3.4 km, was higher than in the three previous years but lower than in 1985 when the figure was 6.5. In the seven years in which stream length was measured the average ranged from 1.6 to 6.5 km. The extent of the fish kills seems to be largely a matter of chance: while the dry weather in June 1992 appeared to have some significance, the summer of 1985 was exceptionally wet. The chance coincidence of large quantities of effluent released into relatively small streams is probably the key factor.

The numbers of fish kills have continued to show an overall downward trend since the peak in 1987. In particular, problems from agriculture showed a steady decrease until 1991 (Figure 3). The slight increase from 22 in 1991 to 26 in 1992 is not statistically significant but does need attention. Silage effluent was far and away the most serious problem in 1987 and the effects of the campaign for its control are still evident: there were fewer incidents of silage-caused fish kills in 1992 than in 1991. Slurry and farmyard washings together accounted for the upward trend in 1992. Agricultural pesticides were implicated in three cases in 1992 and none in 1991. Since 1989 fish kills caused by sewage, industry and all other causes have declined.

Figure 3. Trends in causes of fish kills 1983-1992



Previous reports

Reports are published in the Department of the Marine's *Fishery Leaflet* series. Previous issues are:

Edward Fahy: Leaflet 128 for 1983 and 1984; Leaflet 132 for 1985.

Desmond McCarthy: Leaflet 141 for 1986 and 1987 with summary for 1969-1987.

Desmond McCarthy and Christopher Moriarty: Leaflet 143 for 1988.

Christopher Moriarty: Leaflets 143, 146 and 149 for 1989, 90 and 91

Table 1. Regional distribution of 60 fish kills in 1991. Locations given are nearest place names on Ordnance Survey 'half-inch' map.

				Stream length (metres)		Number killed
		EASTERN REGION (7)				
May	10	Elm Park Stream	Donnybrook O1731	2000	Eel,trout,minnow	500
	22	Bann trib	Camolin T2538	1200	Trout,salmon, minnow	300
Jun	12	Hurley	Macetown O0058	6500	Trout,minnow,s'back	1000
	19	Broomfield	Broomfield H8412	3000	Trout	100
	19	Camac	Clondalkin O0631	2000	Trout,minnow,crayfish	4500
Aug	22	Big River	Riverstown J1605	5	Eel	6
Sep	6	Slaney	Clohamon S9452	1000	Trout,salmon	100
		SOUTHERN REGION (20)				
May	11	Gradogue	Mitchelstown R8113	200	Trout	20
	20	Blackwater	Fermoy R8198	500	Dace,roach,trout,salmon	1000
	28	Dinin trib	Castlecomer S5373	200	Trout,minnow,s'back	55
Jun	12	Funshion	Mitchelstown R7913	2000	Trout	100
	19	Allow	Kanturk R3908	200	Trout	30
	22	Barrow Canal	Athy S6793	20	Perch and roach	50
	25	Philipstown	Clonbulloge N5526	2000	Bream,trout,perch,pike	50
	25	Duncannon	Duncannon S7307	1000	Flounder	70
	29	King's R trib	Callan S4042	100	Trout	20
Jul	2	Carrig	Kilavullin R6101	2000	Trout	100
	3	Allow	Kanturk R4207	3000	Trout	800
	4	Barrow Canal	Athy S6793	100	Perch,roach,pike	100
	18	Barrow Canal	Athy S6793	50	Perch, pike	100
	24	Owenanare	Newmarket R3408	5000	Trout	100
Aug	3	Nore	New Bridge S2287	1000	Trout	50
	26	Blackwater	Mountmellick N4308	6000	Trout,roach	1000
	28	Reservoir.	Knockaderry S4906	0	Trout	40
Sep	3	Burren	Milltown S7958	2000	Brown trout	300
	17	Farney Bridge	Ballycahill S0758	2000	Trout	50
Dec	30	Breaghagh	Kilkenny S5056	250	Trout	150
		SOUTHWESTERN REGION (7)				
May	28	Sullane	Ballymakeery W2276	100	Trout,s'back,loach	300
Jul	30	Bandon	Kilmacsimon W5653	50	Trout,mullet	15
Aug	1	Tramore	Corkcity W6969	50	Trout,lamprey,eel	10
	14	Reservoir	Inniscarra W5472	0	Perch adult and fry	1000
	19	Roury	Connonagh W2438	1000	Brown trout,eel	500
	28	Lough Aderra	Ballintoms B W9483	0	Rainbow trout	50
Sep	8	Owgarriff	Owgarriff B V9986	100	Salmon, trout	400
		SHANNON REGION (14)				
May	21	Ballyvorheen	Ballyvorheen R7555	4000	Salmon,trout,coarse fish	3000
	23	Maigue	Belview R5335	100	Trout	2
	24	Maigue	Castlerochee R4843	100	Trout	10
	27	Maigue	Inchinclare R5336	10	Trout	12
	31	Croughrum	Tuamgraney R6482	1000	Trout	100
	31	Morningstar	Athlacla R5634	100	Trout	2
Jun	19	Maigue	Bruree R5530	100	Trout	20
	22	Carrigahorrig	Aglish R9397	3000	Trout	100
	22	Ollatrim	Ballinveney S7420	5000	Trout,coarse	1000
Jul	2	Lisheenine	Camas B R2929	3000	Trout,minnow	100
	5	Hogan's Pass	Hogan's Pass R8082	3000	Trout	100
	18	Cloonlyon	Ballygar M7852	2000	Trout	1500
Aug	8	Camoge	Grange, R6343	100	Trout	100
Nov	18	Glencorbry	Glin R1353	100	Trout	100
		WESTERN REGION (4)				
Apr	30	Oranmore	Oranmore M3824	2000	Eel,flounder,trout,s'back	1000
May	1	Currarevagh	Currarevagh M0947	2000	Trout	100
Aug	5	Clarinbridge	Ballyboggan M5530	3000	Trout,salmon	10000
	27	Raford	Raford M6227	4000	Trout,coarse fish	3000
		NORTHERN REGION (8)				
Jun	24	Laragh	Laragh H4715	2000	Trout, roach	1000
Jul	26	Magherarny	Magherarny H5930	1000	Trout	100
Aug	8	Lackey	Clone H5026	2000	Roach,pike,perch,bream	1000
	15	Brackley Lake	Brackley L H1820	0	Roach fry	500
	15	Lough Oughter	L Oughter H3404	0	Roach fry	500
	15	Lough Sillan	L Sillan H7106	0	Perch fry	500
	28	Kill Lake	Kill L N4291	0	Pike,roach	16
Sep	1	L Mourne trib.	L Mourne H7413	500	Trout, stickleback	100

Table 1 (Continued) Regional distribution of fish kills in 1992. Locations given are nearest place names on Ordnance Survey 'half-inch' map, followed by National Grid reference.

				Stream length (metres)		numbers killed
		EASTERN REGION (7)				
May	21	Prowles	Carrickmacross H8204	5000	Trout, stickleback	50
Jun	1	Killary/Dee	Yellow Ford Bridge N8885	30000	Salmon,trout,eel,minnow	5000
Jul	4	Boyne	Edenderry N6432	2000	Trout	18
	8	Avoca	Arklow T2374	200	Eel	10
	17	Tolka	Finglas Bridge O1437	300	Trout	100
Aug	1	Killary and Dee	Benjerstown N8784	12000	Trout, salmon, minnow,s'back	500
Sep	27	Nanny	Macetown O0058	6500	Trout, eel, minnow	10
		SOUTHERN REGION (17)				
May	26	Grand Canal	Athy town S6894 S6894	350	Perch, Bream	350
Jun	2	Gowran Stream	Gowran S6053	9000	Trout	300
	7	Gloreen	Abbyleix S4386	1600	Trout	150
	9	Madlin	Old Leighlin S6765	3200	Trout	300
	16	Ballyclough	Ballyclough R5002	5000	Trout	1000
	17	Finnow	Longfield Bridge W2791	8000	Salmon, trout etc.	1000
	30	Kileen (trib)	Kilgorm S6075	2400	Trout	25
Jul	2	Allow	Kanturk R3802	5000	Salmon, trout	1000
	2	Fushogue	Clonmore S6977	4000	Trout 600,eel 100,loach,s'bk	700
	3	Barrow (trib)	Emo N5207	7250	Trout	500
	4	Blackwater	Duncannon Bridge W1892	3000	Trout 1000, salmon 10	1000
	5	Kilnahown	Kilnahown N5111	5000	Trout	15000
	8	Bride (trib)	Kilwatermoy X0488	3000	Trout 100, eel 50	150
	16	Owenanare/Dalua	Kanturk R3813	9000	Trout 300, salmon 100	400
	21	Trib. of Suir	Goold's Cross S0348	2400	Trout, salmon	400
	26	Glashnabrack	Graigue W6986	2000	Trout 700, Salmon 300	1000
Dec	13	Sheep	Skeeheenaranky R9117	3000	Trout, eel, loach	3500
		SOUTHWESTERN REGION (3)				
Mar	3	Spa	Dingle Q4502	400	Trout	50
Sep	28	Tramore	Togher Industrial Est W6670	1500	Trout 20, eel 30	50
Dec	26	Glanshearoon	Castleisland R0212	3000	Brown trout	500
		SHANNON REGION (13)				
Jun	4	Lough Allen	Wynne's Bay G9711	Lake	Bream, pike	1500
	9	Lisheenine	Lisheenine R3032	500	Trout, minnow	100
	19	Deel	Rathkeale R3642	500	Trout	50
	20	Camoge	Kilfrush R7134	100	Coarse fish	10
	23	Trib of Loobagh	Glenbrohane R7426	500	Coarse fish	1000
Jul	1	Deel	Grange Bridge R3034	500	Trout	6
	4	Bunoke	Mahoonagh R3232	3000	Trout	400
	6	Deel	Broken Bridge R3627	500	Trout	30
	8	Derryhippoo	Creggs M7761	4000	Trout	200
	18	Glencorbry	Glin R1346	500	Trout, eel, flounder	250
	26	Legan	Lenamore N2463	5000	Trout, perch, pike	100
	27	Lough Derg	East shore R8180 to R8193	Lake	Perch, bream, eel	2000
	31	Finaway	Kildorragh N5089	300	Trout	29
		WESTERN REGION (3)				
May	25	Dunkellin	Kilreekil M7020	7000	Trout, s'back, loach, eel	1000
Jun	30	Trib. of Dunkellin	Loughrea M6116	100	Brown trout	50
Jul	17	Nanny	Tuam M4452	500	Brown trout 50	50
		NORTHWESTERN REGION (1)				
Jun	13	Eignagh	Aclare G4109	1000	Salmon, trout	500
		NORTHERN REGION (7)				
May	1	Lough Oughter	Killashandra H0433	Lake	Rudd	1000
	18	Clonmany	Clonmany C3745	500	Trout	500
Jun	7	Lough Garty	Arva N2899	Lake	Perch (fry)	5000
	11	Woodford R	Ballinane H1212	50	Roach 100, pike 50	150
	12	Finn	Garryvore H5635	4000	Trout 50, stickleback	100
	24	Annalee	Bellanacargy H4911	4000	Trout,pike,perch,roach,bream	1000
Jul	18	Annalee	Tullyvin H5312	2000	Trout, pike, roach	100

Table 2. Causes of fish kills in 1991. C in last column indicates confirmation, P = press report only.

AGRICULTURAL (22)					
Eastern Region (3)	May	22	Bann (trib)	Cattle slurry	c
	Jun	12	Hurley	Silage and dungstead	c
	Jun	19	Broomfield	Silage	c
Southern Region (5)	Jun	19	Allow	Farm effluent	
	Jun	25	Philipstown	Farm effluent	
	Jul	3	Allow	Farm effluent	
	Jul	24	Owenanare	Silage	c
	Aug	26	Blackwater & Owenass	Farm effluent	
Southwestern Region (1)	Aug	19	Roury	Farm effluent	
Shannon Region (6)	Jun	19	Maigue	Silage	
	Jun	22	Ollatrim	Cattle slurry	c
	Jun	22	Carrigahorrig	Farm effluent	
	Jul	2	Lisheenine & Deel	Silage	
	Jul	5	Hogan's Pass	Silage	c
	Jul	18	Cloonlyon	Silage	p
Western Region (3)	May	1	Currarevagh	Silt from forestry work	c
	Aug	5	Clarinbridge	Silage	c
	Aug	27	Raford	Slurry and silage	c
Northern Region (4)	Jun	24	Laragh	Silage	c
	Jul	26	Magherarny	Poultry and silage	
	Aug	8	Lackey	Silage	
	Sep	1	Lough Mourne trib.	Silage	c
CIVIL WORKS (1)					
Shannon Region (1)	May	31	Croughrum	Fungicide from building	c
DEOXYGENATION (8)					
Southern Region (2)	Aug	28	Knockaderry Res.		
	Sep	17	Farney Bridge		
Southwestern Region (1)	Aug	28	Lough Aderra		
Shannon Region (5)	May	23	Maigue		
	May	24	Maigue		
	May	27	Maigue		
	May	31	Morningstar		
	Aug	8	Camoge		
ENRICHMENT (5)					
Southwestern Region (1)	Aug	14	Inniscarra Reservoir		
Northwestern Region (1)	Aug	15	Brackley Lake		
Northern Region (3)	Aug	15	Lough Oughter		
	Aug	15	Lough Sillan		
	Aug	28	Kill Lake		
INDUSTRIAL (11)					
Eastern Region (3)	Jun	19	Camac	Acid spill	c
	Aug	22	Big River	Cooling water	
	Sep	6	Slaney	Organic effluent	
Southern Region (4)	May	11	Gradogue	Ammonia leakage	c
	May	20	Blackwater		
	Jul	18	Barrow Canal		
	Dec	30	Breaghagh	Toxic effluent	
Southwestern Region (2)	Aug	1	Tramore	Caustic alkali	
	Sep	8	Owgarriff	Effluent spillage	
Shannon Region (1)	May	21	Ballyvorheen	Chemical, source unknown	
Western Region (1)	Apr	30	Oranmore		c
SEWAGE (3)					
Southern Region (2)	Jun	12	Funshion		
	Jun	25	Stream at Duncannon		
Southwestern Region (1)	May	28	Sullane		
UNKNOWN (10)					
Eastern Region (1)	May	10	Elm Park Stream		
Southern Region (7)	May	28	Dinin (Tributary)		
	Jun	22	Barrow Canal		
	Jun	29	King's River (trib)		
	Jul	2	Carrig		
	Jul	4	Barrow Canal		
	Aug	3	Nore		
	Sep	3	Burren	Toxin suspected	
Southwestern Region (1)	Jul	30	Bandon		
Shannon Region (1)	Nov	18	Glencorbry		

Table 2 (continued). Causes of fish kills in 1992, numbers in each category in parentheses in Column 1. C in last column indicates confirmation, P = press report only.

AGRICULTURAL (31)					
Eastern Region (3)	May	22	Prowles	Pig slurry	c
	Jun	21	Killary/Dee	Silage	
	Aug	1	Killary and Dee	Silage	
Southern Region (13)	Jun	1	Gowran Stream	Pig slurry	c
		2	Gloreen	Silage	
		7	Madlin	One or more effluents	
		9	Ballyclough	Slurry tanker discharge	
		16	Kileen (trib)	Silage and slurry	c
		26	Finnow	Pesticide spillage	p
	Jul	30	Allow	Silage and slurry	c
		2	Fushogue	Pesticide	
		2	Kilnahown	Farm effluent	c
		5	Bride (trib)	Pesticide	
		8	Owenanare & Dalua	Farm effluent	
		16	Trib. of Suir	Farm effluent	
		21	Glashnabrack	Farm effluent	c
Shannon Region (10)	Jun	9	Lisheenine	Farm effluent	
		19	Deel	Farm effluent	
		20	Camoge	Farm effluent	
		23	Trib of Loobagh	Farm effluent	
	Jul	1	Deel	Farm effluent	
		4	Bunoke	Farm effluent	c
		8	Derryhippoo	Farm effluent	
		18	Glencorbry	Farm effluent	c
		26	Legan	Silage and slurry	
		31	Finaway	Piggery effluent	c
Western Region (1)	May	26	Dunkellin	Slurry	c
Northwestern Region (1)	Jun	25	Eignagh	Farm effluent	
Northern Region (3)	Jun	13	Finn	Silage effluent	c
	Jun	12	Annalee	Silage	
	Jul	24	Annalee	Silage and cattle slurry	c
CIVIL WORKS (4)					
Southern Region (1)	Dec	13	Sheep	Cement spill from bridge	c
Western Region (2)	Jun	18	Trib. of Dunkellin	Storm runoff	
	Jul	30	Nanny	Swiming pool discharge	
Northern Region (1)	Jun	17	Woodford R	Canal drainage	c
ENRICHMENT (6)					
Southern Region (1)	May	11	Grand Canal		c
Shannon Region (3)	Jun	4	Lough Allen		
	Jul	6	Deel		
		27	Lough Derg		
Northern Region (2)	May	26	Lough Oughter		c
	Jun	1	Lough Garty		c
INDUSTRIAL (5)					
Eastern Region (2)	Jul	8	Avoca		
		17	Tolka		
Southern Region (1)	Jul	7	Blackwater		
Southwestern Region (1)	Sep	4	Tramore	Wash water	
Northern Region (1)	May	28	Clonmany	Timber preservative	p
SEWAGE (1)					c
Eastern Region (1)	Jul	18	Boyne		
UNKNOWN (4)					
Eastern Region (1)	Sep	4	Nanny		
Southern Region (1)	Jul	27	Barrow (trib)		
Southwestern Region (2)	Mar	3	Spa		
	Dec	26	Glanshearoon		

Table 3. Total length of stream (in kilometres) and number of incidents (n).

Region	*1989*		*1990*		*1991*		*1992*		*1989-1992*		
	km	*n*	*km*	*n*	*km*	*n*	*km*	*n*	*km*	*n*	*mean*
Eastern	54	24	57	13	16	6	56	7	183	50	3.7
Southern	33	20	33	15	28	19	65	16	158	70	2.2
Southwestern	14	23	6	4	1	5	5	3	34	36	0.9
Shannon	55	17	10	6	22	14	14	13	101	50	2.0
Western	3	3	1	2	11	4	8	3	23	12	1.9
Northwestern	5	4	6	2			1	1	12	7	1.7
Northern	5	4	9	3	5	4	15	5	34	15	2.2
Total	168	95	122	45	83	52	164	48	541	240	2.2
Annual mean	1.8		2.7		1.6		3.4		2.2		

Table 4. Numbers of fish kills recorded from 1983 to 1992.

	1983	*1984*	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*Total*
January		1			1			1			3
February		2	1		2	1					6
March		4	1	1		3	1	2		1	13
April	1	4	2	1	1	6	3	3	1		22
May	2	10	3	1	16	9	15	10	13	5	84
June	23	34	23	36	51	19	34	12	13	18	263
July	38	31	6	17	31	1	48	10	10	22	214
August	15	12	1	3	18	6	9	7	16	1	88
September	3	8	1	1	2	3		6	5	2	31
October		3	1	6		1	1				12
November	2	1	1			1	1		1		7
December	1		1					1	1	2	6
	85	110	41	66	122	50	112	52	60	51	749

Table 5. Regional distribution of fish kills

	1983	*1984*	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*Total*
Eastern	30	22	11	11	22	13	28	14	7	7	165
Southern	12	27	14	7	37	9	24	15	20	17	182
Southwestern	7	11	3	4	11	6	27	5	7	3	84
Shannon	7	32	5	28	27	14	17	7	14	13	164
Western	6	2	1	2	4	0	3	3	4	3	28
Northwestern	6	2	0	0	2	5	4	2	0	1	22
Northern	15	13	7	14	19	4	9	6	8	7	102
	83	110	41	66	122	50	112	52	60	51	747